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ORAL POLIOVIRUS VACCINE

WITH the announcement by the Minister of National Health and Welfare, on March 6, that a trivalent oral polio vaccine, prepared from the three types of Sabin's live attenuated poliovirus, has been licensed for distribution in Canada, an additional weapon has become available to combat and, it is to be hoped, virtually eliminate epidemic poliomyelitis from this country. During the past seven years a trivalent polio vaccine rendered noninfectious by treatment with formaldehyde, as developed by Dr. Jonas Salk, has been used extensively in Canada. It has been estimated that about 70% of the population under the age of 40 years had received a full course of at least three doses of the Salk vaccine by the end of 1961 and that over 90% of the individuals thus treated were protected against the paralytic form of this disease. The incidence of poliomyelitis in Canada has been declining steadily since the introduction of Salk vaccine, except in the year 1959 when the disease recurred in epidemic form. However, the analysis of this outbreak indicated again that a high degree of protection was attained only by those subjects who had received the full course of vaccination.

Although Salk vaccine does protect against the paralytic disease, it does not prevent an adequately vaccinated individual from becoming a carrier of "wild" strains of poliovirus circulating in the population. Salk vaccine does not immunize the intestinal tract of the vaccinee and therefore does not prevent the "wild" strains from multiplying and being disseminated in the population. The risk of infection by polioviruses has not diminished in recent years, and this will be of particular danger to those population groups which have not received protection by vaccination.

A number of scientific groups, realizing that the Salk vaccine may not eliminate epidemics of poliomyelitis, have worked during the past decade on the development of a live attenuated poliovirus vaccine which, taken orally, may simulate a natural infection without producing the paralytic disease. Since the human intestinal tract becomes immune after a natural infection with "wild" poliovirus and thus does not permit multiplication of the virus on reinfection, it was assumed that the live vaccine would have a similar action. Three groups of scientists led by Dr. Hilary Koprowski of the Wistar Institute, Philadelphia, Dr. Albert Sabin of the University of Cincinnati and Dr. Herald Cox of the Lederle Laboratories, Pearl River, N.Y., were responsible for the development of live polio vaccines. On the recommendation of the World Health Organization that these new vaccines should be employed first in countries in which Salk vaccine had not been used extensively, large field trials were carried out since 1957 in Central and South America, the former Belgian Congo, Singapore, Poland, Czechoslovakia and the Soviet Union. By the end of 1961, the Koprowski vaccine had been administered to more than nine million people; the Sabin vaccine and the Russian vaccine using the Sabin strains of poliovirus, to more than 120 million, and the Cox-Lederle vaccine to about two million. The first results concerning the safety of these vaccines were reported at meetings of the Pan American Sanitary Bureau in Washington in 1959 and 1960 and at the International Conference of the U.S.S.R. Academy of Sciences in Moscow in 1960. At these meetings, the various scientific groups participating in the field trials expressed satisfaction with the high degree of safety of the vaccines employed. The protective value of the vaccine was discussed at a meeting of the World Health Advisory Committee in Geneva in November 1960, and at a symposium of the European Association against Poliomyelitis, in Oxford in September 1961. Particularly striking was the success of the Czechoslovakian program which showed that not a single confirmed case of paralytic poliomyelitis was reported in 1960 following the vaccination of over 90% of the population with Sabin vaccine in the spring of that year, whereas in the previous two years an average of 300 cases per year, and in 1957 nearly 600 cases, had occurred in that country. A similar experience was encountered in Cincinnati by Dr. Sabin. After vaccination of about 200,000 persons early in 1960, no cases of paralytic poliomyelitis were observed during that year in the population of that area. This was the first year since 1939 that no cases of poliomyelitis were reported in Cincinnati.

The Canadian experience with the Sabin vaccine, produced by the Connaught Medical Research Laboratories in Toronto, was first gained in 1960 with limited trials in the Province of Quebec, which were mainly designed to demonstrate the genetic stability and antigenicity of the virus strains used in the vaccine. Larger demonstrations of the safety and effectiveness followed early in 1961 in

Prince Albert, Saskatchewan, and Wedgeport, Nova Scotia. The results of these trials were evaluated by the National Technical Advisory Committee on Live Polio Vaccines, a group of Canadian scientists chosen by the Deputy Minister of National Health and Welfare to advise his Department and the Dominion Council of Health on the development and use of the new vaccine in Canada. The Committee reported in November 1961 to the Dominion Council that the trivalent oral polio vaccine, containing the Sabin strains of poliovirus types 1, 2 and 3, was highly antigenic in seronegative individuals and in those who had failed to respond to several doses of Salk vaccine. No ill effects of consequence attributable to the vaccine were observed in the population during and after the vaccination programs. No evidence could be found to indicate any spreading of the polio vaccine virus from the vaccinated population groups to unvaccinated neighbouring communities. The ease of administration of the vaccine and the high rate of its acceptance by the adult population make it particularly suited for mass vaccination. Another advantage of the live oral vaccine lies in the fact that it can be given at the start of or during a poliomyelitis epidemic in order to bring such an epidemic under control.

The Committee recommended that the new live oral polio vaccine should be used in its trivalent form under supervision of the Provincial Departments of Health on a community basis. The use of oral polio vaccine in monovalent form does not warrant the greater cost and administrative difficulty when compared with the use of trivalent vaccine. It is not expected that the oral vaccine will entirely replace the Salk vaccine, at least not within the foreseeable future, since the Salk vaccine with its outstanding success will still be used in combination with other antigens, such as diphtheria and tetanus toxoids and pertussis vaccine for primary immunization programs in infants. The Sabin vaccine will also be useful as a supplementary or booster dose for the majority of persons who already have received a full course of Salk vaccination. In such cases a single dose of the oral vaccine will be sufficient.

In order to obtain complete protection of non-immunized persons against the three strains of virus, at least two doses of trivalent oral vaccine, given at an interval of four to six weeks, are required. It has been found that after the first feeding of a trivalent vaccine only about 60% of seronegative vaccinees develop antibodies to all three types of virus, while over 90% of such persons react promptly to type 2 and 3 poliovirus. Type 1 appears to be less able to establish itself in the alimentary tract in competition with the other two strains. It has also been shown that a current acute infection of the intestinal tract with another enteric virus, such as a member of the Coxsackie group, may reduce the effectiveness of one or more of the vaccine strains, thus leaving the vaccinee with inadequate protection after only one dose of the trivalent polio vaccine. In order to avoid such interference by other enteric viruses, vaccination should preferably be carried out during the winter and early spring, when circulation of these enteric viruses in the population is at a very low rate.

The vaccine will be distributed for the time being through the Provincial Departments of Health in order to make the best possible use of supplies available. It will be used in community-wide vaccination programs which, in the present state of knowledge, provide the most effective method of immunization with an oral polio vaccine. It will be issued in syrup form in 100-dose and 10-dose vials, 0.5 ml. representing a single oral dose. An eye dropper, graduated to a single dose, will be provided with each vial. The vaccine can be dispensed into distilled or de-ionized water or milk, or on a lump of sugar, or it can even be dropped directly into the mouth, depending on the age and preference of the vaccinees.

Judging from the experience in the past, it can be assumed that the acceptance rate of the new vaccine by the population will be above 80%, which is the desirable level of community protection to achieve elimination of poliomyelitis as an epidemic disease. F.P.N.

THE "OFFICIAL" MANUAL OF TUBERCULOSIS

THE eleventh edition of "Diagnostic Standards and Classification of Tuberculosis" has recently been released by the National Tuberculosis Association. While this has always been a valuable monograph, the present edition has been so revised, externally and internally, as to be almost unrecognizable. While the 1955 edition was modestly clothed in a plain buff cover, with black lettering, the present edition is resplendent in red and white, with brilliantly coloured representations of the bronchopulmonary segments and the anatomy of a primary pulmonary lobule, on the inside front and back covers. The volume, familiarly known to tuberculosis workers throughout Canada and the United States as "Diagnostic Standards", has been and continues to be a rather complete exposition of the practical aspects of "the tuberculosis situation", embodying items of information not usually available within the covers of a single volume, and comprising material of value to the general clinician, tuberculosis physician, radiologist, bacteriologist, surgeon, public health official and medical student. In other words, like Francis Bacon, "Diagnostic Standards" "takes all knowledge [concerning